nism **2350** to allow the reagent modules such as ampoule(s) to be broken during the cartridge retraction/positioning step.

[0301] In certain embodiments the measurement step may comprise reading the signal from each read chamber separately. While this may be accomplished by using a single suitable detector and optimal positioning of the cartridge's read chambers in relation to the single detector, successful measurement/detection may also be carried out by repositioning the desired read chamber in relation to the single detector or repositioning the detector in relation to the desired read chamber. For such an embodiment, the cartridge handler subsystem may include a separate motor to allow for positioning of the cartridge and/or the detector. In a particularly preferred embodiment, the cartridge handler subsystem is adapted and configured to precisely position the cartridge or the detector, or both, such that the detector is in registered alignment with the precise location where the measurement is being performed; e.g., the working electrode presently being stimulated to produce ECL.

[0302] In a preferred embodiment a barcode reader **2365** is incorporated on/within the cartridge reader to preferably automatically scan an identifying mark/label **2370** on the cartridge; e.g., as it is drawn into the reader. The label may contain encoded information relating to the specific assays that are to be performed, calibration parameters and/or any other information required to perform the assay. Further, a preferred embodiment may incorporate a heater within the cartridge reader to warm the cartridge to a predetermined temperature, e.g., 37° C., before proceeding.

[0303] Preferably, the reader does not come in contact with liquids contained within the cartridge. This feature may be accomplished by using pneumatic pressure applied at the vent ports to drive fluids in the cartridge. The fluidic handler subsystem preferably includes a pump **2345** (preferably a piston pump) to selectively apply positive and/or negative pressure (i.e., apply a vacuum) to one or more of the cartridge's fluidic components in order to selectively control movement of fluids within, and through, the cartridge and its various fluidic components. The fluidic handler subsystem is preferably adapted and configured to fluidically engage the cartridge at one or more fluidic control points; e.g., positive control ports, vent ports, and the like and includes fluidic connectors for providing these fluidic engagements. Selective application of pressure to the cartridge's fluidic components is preferably achieved by incorporating a fluid manifold **2340** housed within the cartridge reader to simplify and enhance the fluidic engagement function and to minimize the number and complexity of fluidic systems. Advantageously, the fluidic manifold **2340** can be adapted and configured to facilitate the use of a single pump; i.e., control valves **2342** can be incorporated within the fluidic manifold **2340** to selectively control fluid movement within and through the various fluidic components of the cartridge. The fluidic handler preferably includes a pressure sensor to facilitate precise/repeatable movement and/or positioning of fluids within the fluid network. The fluidic connectors, preferably, comprise aerosol-prevention plugs or gas-selective membranes (i.e., materials that selectively allow the passage of gas but prevent the passage of liquids) to prevent contamination of the reader fluidics with liquids in a cartridge. The components comprising these plugs or membranes are, preferably, easily removed and replaced if they become contaminated with liquid. Aerosol-prevention plugs are commonly used in pipette tips to prevent contamination of pipettors and include materials that allow the passage of air when dry but swell and seal up the passage when they come in contact with liquid (e.g., filter materials impregnated or coated with cellulose gum).

[0304] The fluidic handler subsystem preferably employs fluid sensors (not readily seen in FIG. **23**. FIGS. **12** and **17** illustrate alternative fluid sensor layouts in relative arrangement to the cartridge/fluidic network), e.g., reflective photo sensors, positioned at predetermined locations within the fluid network. In accordance with these preferred embodiments, the fluid sensors are positioned in registered alignment with the labeled optical detection points located on the cartridge body. Sensor signal data may be used to provide fluid positional information which may be used to control pump operational parameters such as pump speed, direction and the duration of a specific pump operation. In addition to precise control of fluid movement within and throughout the cartridge, fluid sensors may be used to control mixing of fluids (e.g., during the incubation period, and evacuation of sample from the read chambers during the wash and read cycle) by, e.g., defining the limits of the motion of slug fluid fronts during back and forth mixing motions and/or by measuring an optical property of the fluid such as absorbance or light scattering that is indicative of the state of a mixing operation. The fluid sensors may also be used to conduct viscosity measurements on a sample. In one embodiment, the reader pump is directed to move the fluid front of a sample through a fluidic conduit from one optical sensor position to another by operating the pump at a predefined speed or under conditions designed to achieve a predefined pressure gradient. The time needed to move the fluid between the two positions is indicative of the viscosity. Such a viscosity measurement is optionally used to measure the coagulation time of a blood or plasma sample (e.g., whole blood clotting time, thrombin time, prothrombin time, partial thromboplastin time and/or activated clotting time). Such a method may further comprise introducing one or more coagulation reagents (e.g., by passing the sample over a dry reagent comprising these reagents) prior to conducting the timing step. Suitable reagents for measuring thrombin time may include thrombin. Suitable reagents for measuring prothrombin time may include thromboplastin and/or calcium. Suitable reagents for measuring partial thromboplastin time may include cephalin and a negatively charge substance (preferably, diatomaceous earth, kaolin, glass particles and/or ellagic acid). Suitable reagents for measuring activated clotting time may include negatively charged substances such as diatomaceous earth, kaolin, glass particles and/or ellagic acid,

[0305] While the use of optical sensors to monitor fluid flow is advantageous, it is not required. In certain alternate embodiments, fluid movement operations are conducted by operating a pump for a predefined time at predefined speeds, or under conditions which have been determined (e.g., through calibration of the pump) to result in a predetermined movement of a fluid slug.

[0306] The assay electronics subsystem preferably includes electrical contacts, sensors and electronic circuitry. The electrical contacts **2330** are preferably adapted and configured to be placed into electrical contact with the electrode array. In one preferred embodiment, the cartridge reader's electronic circuitry may include analog switching and trans-impedance amplification circuits to address a specific pair of electrodes (i.e., pair-wise firing, discussed in greater detail above) and apply a predefined voltage waveform to the circuit formed by that electrode pair. The actual output voltage and